



Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact support@jstor.org.

A curious question is raised in the course of the argument of M. de Quatrefages. Dr. Pruner Bey has stated "that the Polynesian language (?) is the most emasculated language in existence." In what way such a fact could aid in the elucidation of the physical origin of the races of Polynesia it would seem difficult to understand. And the assumption that the earliest settlers from Asia, as brought forward by M. Quatrefages, should rather have selected Samoa and Tonga than islands nearer the coast of Asia, does not help us; and yet M. Quatrefages assumes the existence of a different and aboriginal race in these islands. Does this not practically defeat the learned author's main argument? If in any one portion of the globe we find it admitted that there has been discovered a race possessing a definitive osteological and physiological basis of its own, the question between monogenists and polygenists must come to an end. And such an admission as this from so eminent an anthropologist seems likely to tend to such a result, although in the face of the theory adopted by him.

Science on this point is yet silent, and this most interesting of all questions remains to be elucidated by an appeal to facts, and cannot be settled except we are furnished with more evidence.

There are many important chapters in M. de Quatrefages' work, to which we have not space at present to advert; and, while it is impossible to coincide in the inferences drawn by the author, the book cannot but be considered a most valuable addition to anthropological literature.

ON THE PRIMITIVE PERIODS OF THE HUMAN SPECIES.*

WE now come to the caves, where the finds are much more important. First of all, we have to thank M. Fuhlrott for having furnished us with a more correct determination of the age of the Neander skull. All the nonsensical theories propounded concerning this skull are thus upset by one blow; and the Neander skull is placed in the same category as to age with that of Engis, the antiquity of which is definitely fixed. We must, at the same time, in opposition to such anthropologists as do not pay the necessary attention to geological facts, assert that these—the oldest skulls we know of, excepting, perhaps, the Moulin-Quignon skull, not yet examined—are most decidedly dolichocephalic. Since the theory derived from the Northern stone men, that the first inhabitants of our continent were brachycephalic, has still some ad-

* *The Primitive Period of the Human Species* By Carl Vogt. Continued from No. xvii, p. 221.

herents and defenders, it may not be superfluous to call this fact to mind which upsets that whole theory.

The geological character can mostly only be established by particular attention, and even then, but imperfectly. It is already difficult to acquire a correct notion of the mode in which the cave was filled. There is no doubt, as proved by flints, lehm, and sand in the deposits, that water has been the great agent. Most observers are, however, too much inclined to assume tumultuous water streams, even in cases when slow infiltration may have produced the same effects. The observations on infiltration into stone coffins, the dislocation of corpses from their relative position by the intrusion of sand and earth, the introduction of flints through cracks, and even into the cranial cavity as shown by Broca and others, may be applied also to caves. I already observed in my *Lectures on Man* that the filling up of the bear cave at the Stooss in Schwytz, with a light earthy material, and that at a spot where rills neither exist nor existed, that such fillings of caves may be effected by atmospheric waters, without any violent commotion, but very slowly and gradually by the imperceptible descent of earthy and pulverised particles, including even flints and rubble.

Steenstrup, with much acuteness, and assisted by the abundant materials existing in Copenhagen, has lately given us an important contribution towards the determination of the geological character by showing that a number of changes occurring in the bones found in caves, diluvial formations and osseous breccia were not, as formerly believed, the effects of the water nor of the handling of man, but are solely to be ascribed to the teeth of beasts of prey. In comparing thousands of bone fragments from kitchen-middens, caves, and breccia, Steenstrup was first surprised by the almost constant absence of vertebrae, so that amongst several thousand fragments of femoral bones not one vertebra was found, and that other bones are always injured on the same spot; the long bones, for instance, in the articular processes, while others again, the horizontal ramus of the lower jaw, for instance, are always to be found. What he had observed in the north he found confirmed in the bones of the south brought to day-light from the caves of Montpellier by Marcel de Serres and others. Here, therefore, we possess a general law, the law of injury, the cause of which is easily ascertained by experiment. All beasts of prey gnaw the bones of a mammal or bird of a certain age in the same manner, by rejecting the more solid parts, but keeping to the spongy portions which contain fat and are covered by cartilage and muscular attachments. The bones of young animals, which offer no great resistance to the teeth of the beast, of course, form exceptions. Man, on the

other hand, treats bones quite differently. He first breaks the long bones—despised by the animal—in order to get at the marrow, or he shapes them to implements. Damp air and alternating dryness effect other lesions, such as cracks and chinks, which may induce the splitting of bones. Steenstrup was thus enabled to show that the bones of the caves of Montpellier which Marcel de Serres believed to have been acted upon by the waters, had really been mutilated by beasts of prey, and that the filling of the caves had been effected by the bones being dragged in. He also showed that the bones open on both ends, which Boucher de Perthes believes to be handles to fix upon the hatchets, had been prepared by beasts of prey and not by man, and that, finally, the clefing of the bones found in the breccia of Nizza and Ortibes was the result of their long exposure to the open air. On looking at the figure of the skeleton of an ox, upon which Steenstrup by shading has represented the respective influences of man and beasts of prey upon the separate bones of the animal, it appears to me as if the mutilations of the lower jaws of bears of the cave of L'Herm which Garrigou holds to be primitive implements formed by the hand of man, and for which I then knew no better explanation, are equally the effect of gnawing, perhaps by surviving bears.

Those caves are of special importance which present a distinct stratification of their contents, and in these strata bones of distinct species of mammals. For, as already observed, it is not of so much importance what may be found in a cave, but in what position it is found. Caves may have been filled up by gradual deposits in an earlier or later epoch, entirely or partially; the deposits of earlier epochs may have been disturbed and intermixed with the deposits of later epochs. Man may himself, by inhabiting or burying his dead in caves formerly inhabited by beasts of prey, have caused such intermixtures in partially filled up caves. It also becomes necessary to note the condition of each bone, and in what position one or another piece is found. If this be neglected our labours may be in vain. Thus, a M. Bourgeois examined a crevice at Caves, near Amboise, which presented three different deposits. At the bottom, clayish marl, with many and large bones; in the middle, yellow clay, with very few bones; on the top, sand and rolled stones, with many small bones. This collection consists of bones of the cave hyæna, cave tiger, cave wolf, fox, badger, weasel, mole, horse (probably the extinct *Equus Adamanticus*), fossil rhinoceros, wild hog, urus, peat stag, and also some frog and fishbones, including some fresh-water shells. But with such a most interesting collection of bones, the unfortunate possessor cannot tell us in what stratum he found either of these species; whether the horse bones lay side by side with those of the cave tiger

or not, so by this want of attention the whole find is almost without value.

In advantageous contrast to such neglect stand the explorations of the Marquis de Vibraye in the so-called fairy grotto near Arcy, and those of MM. Filhol and Garrigou, in the cave of Maz-d'Azil (Ariège). The former points out three different beds. The lowest, in some spots $1\frac{1}{2}$ metres thick, fills up the inequalities of the ground in the scooped out long and winding grotto, and contains well marked bones of the cave-bear, cave-hyæna, *bos priscus*, and *equus adamiticus*. There was also found a human jaw, of the same aspect as the bones of bears. The middle stratum consists of fragments of lime, from the roof and the walls, and are united by a red sandy-clayish cement, as is the case in all osseous breccia of Southern France. In this stratum are chiefly found bones of ruminants, specially of the reindeer in large numbers, horse and ox bones, and flint knives coloured red by the iron oxide of the covering. The uppermost stratum consists of sandy marl, and in aspect resembling löss; contains remains of animals still existing in the country, such as fox, badger, mice, etc. Besides these regular deposits, there were some individual funnel-shaped depressions, manifestly destined for hearths, filled with pieces of coal; lance and arrow heads, made of antlers and bones of deer. These could easily be demarcated from the undisturbed deposits. In the cave of Maz-d'Azil, Filhol and Garrigou also found three superposed strata; the lowest containing bones of the cave-bear and cave-tiger, but no trace of man, excepting perhaps a perforated phalanx of a bear, which was held to be an art product. The middle layer, which was used for road-making before the naturalists became aware of its contents, contained only bones of the large pachydermata. The upper stratum yielded, besides a number of rudely worked reindeer-bones, a large quantity of rude flint implements, evidently produced by percussion.

Observations of this kind, which are but rarely made—for, of all caves hitherto explored, I know, apart from the cave of Lombrive, only of the above—admit of certain inferences as regards the relative chronology of the deposits. In the grotto of Arcy is manifested a definite separation of the epoch of the cave-bear from that of the reindeer. In that of Maz-d'Azil, a bed containing elephant and rhinoceros bones intervenes, the bones of which are, in the other caves, intermixed with those of the bear. This latter observation might, perhaps, offer some basis for the separation of two periods, for the cave-bear and the mammoth; which requires, however, further confirmation, as, from its rarity, it may be looked upon as a local incident caused by peculiar conditions.

As already stated, caves with distinctly separated deposits are ex-

ceptions ; whilst such caves as are filled up uninterruptedly within a single epoch form the rule. In the exploration of such caves, we must always keep in view that the filling them is a local phenomenon ; that the filling up with the same material (red or dark sand-*lehm*, with rolled and other flints) may have taken place at very different periods ; and that, even in adjoining caves, there may obtain great differences as regards the time of their being filled up. The Belgian caves afford in this respect some valuable hints. Schmerling, who more than forty years ago explored the caves of Liège, found every where the cave-bear in such quantity that its bones and teeth constituted the essential character of the contents. Last year, some Belgian naturalists turned their attention to the caves of the province of Namur, and obtained remarkable results, of which we shall speak presently. But all caves hitherto explored belong to the reindeer period, and only yield the bones of the common brown, and not of the cave-bear ; and yet these caves are not so very distant from those of Liège, scarcely sixty miles off. M. Dupont undertook the geological investigation, whilst M. Beneden selected the anatomical determination of the bones. The latter told me, in conversation, that he could not explain it, and must, therefore, ascribe it to accident that Schmerling had only come to such caves the contents of which had repeatedly been disturbed and intermingled by the waters. Possibly this may be so ; but I rather am of opinion that the difference arises from this, that, despite the perfect equality of the geological character in both caves—namely, the same aspect of the ossiferous *lehm*, the same condition of the fissures and the mountains in which they occur (carboniferous and Devonian limestone), and the similar conditions of the valleys and ravines,—I say, despite these resemblances, the filling up of the caves may have taken place at different periods.

If this be the case, it follows that we must be exceedingly cautious before drawing general conclusions from the geological character. On finding in any spot mud, sand, *lehm* with rolled stones, rubble and bones, in a cave beneath a stalactite roof, and, at a distance say of ten, twenty, or fifty miles, other caves with similar contents, we are irresistibly led to generalise, and to assume a general deluge which covered the land above a hundred meters over the present sea-level, and filled up the caves. Having the deluge, no further trouble is necessary. This may satisfy a pious soul, or natural history founded on the Old Testament ; but, on closer examination, we find that sand, clay, rolled flints, and scattered bones neither prove flood nor river ; and that, assuming even floods and inundations, these may have taken place in limited localities and at different times, consequent on local thunder-storms and rain-spouts. Thus our deluge is reduced to a

number of separate thunder-storms and inundations, which, as at this day, may occur in different localities, and produce there the usual effects of such events. The historian who describes the incursions of the Germans, Huns, Turks, and Cossacks into Europe as a contemporaneous phenomenon, acts like the geologist who looks upon the filling of the ossiferous caves and fissures from the tertiary period to the present epoch as a connected phenomenon. The further we advance in our investigations, the more must we descend to particulars before laying down general conclusions. We must always bear in mind that very different causes may produce the same effects; that cinnabar may be produced by either the dry or humid process; that felspar may, by crystallisation, separate from the water as from a fiery river; that land and marine plants may both give rise to coal-formations; and that caves may be filled either by water-streams, or by slow infiltration, or by means of beasts of prey and man; and that all this may occur at very different periods, and at long intervals. But, unfortunately, we are always led by the deciphering of an individual process to imagine that we have found a magic pass-key which opens all closed doors.

The palæontological character of such caves as present only deposits of one epoch determines, according to the presence or absence of the cave-bear, two well-defined groups, and enables us to pass a judgment. It has been repeatedly pointed out, that the first fauna of the diluvial formations contains already all the types of the wild mammals of Europe; but there are also found in it specimens of extinct or emigrated species. The epochs of the diluvial formation cannot, as may often be done in palæontology, be demarcated by the appearance of certain species, but, on the contrary, only by their disappearance; thus changing the character into a negative one, which can never have the same validity as a positive character. The existence of cave-bear bones thus indicates the time the cave was filled; whilst the absence of such bones can only be looked upon as a relative, not as a positive proof, that the cave has been filled at a later period. But here the contemporaneity of some species may serve to strengthen the proof. *Hyæna*, tiger, mammoth, rhinoceros, were contemporaries of the cave-bear, and play, in fillings of this kind, an important part; whilst wolf, badger, lynx, but especially sheep, goats, and oxen, in large numbers, are rather more commonly found associated with the reindeer, and but rarely occur in bear-caves.

In Germany we know at present only of bear-caves; occurring also almost exclusively in Central France, although they are not entirely wanting in Languedoc and the Pyrenees. England and Eastern Belgium also have only bear-caves, or those with corresponding contents,

like the hyæna-cave at Kirkdale. In the Southern Alps and the Pyrenees, which do not seem to have been crossed by the cave-bear and his contemporaries, the caves and fissures containing bones of the hippopotamus and the *el. meridionalis* and *antiquus* may correspond with the northern bear-caves. As M. d'Archiac and others have observed, the Mediterranean fauna is, from that of the North, during the diluvial formations, much more distinct than at present ; so that but few species of mammals, and of these only the smaller ones, not the larger and more important ones, can be named as common to both faunæ.

I know of no fact, excepting the grotto of Maz-d'Azil, which indicates that the mammoth and the fossil rhinoceros have in Central Europe lived later than the cave-bear. As I can in the other characters find no trace of a separation of epochs, the distant periods of the cave-bear and the mammoth, as assumed by Lartet, appear to me to form but one epoch. Of this period we know only the two skulls of Engis and the Neanderthal. The sepulture of Aurignac, which might have given some clue, has, as regards anthropological investigation, been nullified by an unscientific country surgeon. A skull from a Franco-nian cave, which was formerly preserved in a lumber-room at Munich, admits of doubts regarding its antiquity, as it was not found in the ossiferous soil, but only in the stalagmite. It is useless as an anthropological study, from being, as Professor Oppel told me, covered within and without with a stalactite mass, so as to admit of no measurements. Other remains, such as jaws, teeth, and other bones, have no great claims to be considered as anthropological characters.

In endeavouring, from the discoveries hitherto made, to form conclusions respecting the civilisation of this long-headed (inferring from the Neander skull), powerful, tall, and strong primitive man, who lived by the side of the cave-bear and the mammoth, we perceive that already then he honoured his dead by burying them, probably in a crouching position, in grottoes closed with slabs ; and that he furnished them with meat and arms for their journey into another world. He knew the use of fire, and constructed hearths, where he roasted his meat ; for of pottery the traces are but few. He broke the long bones of the larger animals in a systematic manner, in order to extract the marrow ; and also the skull, to obtain the brain. His implements or weapons consist of rude hatchets and knives, which were struck off from a flint block by another stone ; and of worked bones, employed for handles, arrows, clubs, or awls. Such pieces as look like pike or arrow heads never show any grapple-hooks, but smooth sides. This wild primitive man, the wildness of which is indicated by his terrible superciliary arches, nevertheless endeavoured to ornament his person

with perforated pieces of coral and the teeth of wild animals. He probably dressed in skins or prepared bark of trees; for the awls and needles found may have been serviceable for patching together such materials, but not for weaved stuff. We possess no direct information respecting his food, besides that he procured from the chase. The great number of flint instruments found in the caves, since attention has been drawn to this subject, lead us to infer that this man had spread over the whole of Central Europe this side of the Alps: whether in a single or various types, will only be decided when we are in possession of a greater number of skulls.

We shall now pass on to the epoch of the reindeer, the more accurate knowledge and distinction of which may be looked upon as a recent acquisition of science, for which we are chiefly indebted to the indefatigable efforts of M. Lartet. Hitherto this epoch has been only known to us in grottoes and caves, or in a kind of kitchen refuse at Madeleine, in the department of Dordogne. The most eastern locality where reindeer bones, as far as I know, were found, is the Salène, near Geneva; the most northern, the caves in the province of Namur, in Belgium—namely, that of Furfooz, near Dinant. But most reindeer bones have hitherto been found in Central France and in Languedoc. The palæontological character of this period is at present pretty nearly defined. Mammoth and rhinoceros occur very rarely; but the large beasts of prey have disappeared, and been supplanted by the brown bear, the serval, the wolf, the lynx, the iltis, which, however, occur simultaneously with the former. The bison *Europæus* and the *bos primigenius*, the *cervus elephas* and the *cervus pyrenaicus*, the roe and the reindeer, are found together with the chamois and the ibex, both of which seem to indicate a colder temperature and the advance of the glaciers towards them. Neither are horse and ass, wild hog and hare, mole and field-mouse, altogether absent. No trace, however, of domesticated animals, either of carnivora or herbivora; and the bones of all these animals, which manifestly served man for sustenance, are split in the same manner, and the skulls by the same method, namely, by striking off the horns in the horned animals, as was done in the preceding period.

The grottoes of Eyzies and Langeries-basses, Bruniquel, Massat, Lourdes, Figeac, Bize, and Brengues, mostly situate in the south of France, and those of Furfooz in Belgium, form at present the types of the caves of the reindeer period, showing mostly only a single deposit, sometimes resting upon a bed of rolled flints or coarse sand, which, without satisfactory proof, is considered as corresponding with the period of the cave-bear.

In one only of these grottoes, that of Lourdes in the Pyrenees,

Garrigou and Marten assert to have recognised two strata. The superior stratum, which already had before been explored by Lartet and Alphonse Milne-Edwards, contains many bones of the bison and the aurochs, less of those of the reindeer and horse, but still rather numerous. On the other hand, the bones of lynx, wild hog, stag, chamois, ibex, and a small species of bovidæ, and also mole and field-mouse, goat and sheep, are rare; coals and many worked and chiselled bones, of which presently more have also been found. In the lower level, the bones of which are much older and more decomposed, the reindeer bones were in greater abundance; beside them the bison, horse, stag, a small species of oxen, ibex, a sheep, and two rodents; flint implements of all kinds, but all unpolished; bone instruments, one showing the figure of a fish engraved. The authors of the report conclude, therefore, that the strata belong to separate epochs; the upper one to the period of the aurochs or bison as assumed by Lartet, and the lower to the period of the reindeer. I confess I am unable to perceive any marked distinction. The species of animals in both strata are the same, neither do the objects of art differ; the decomposition of the bones in the lower bed may have been the result of local influences.

We possess from the reindeer period human remains in no inconsiderable number, but mostly only single pieces, phalanges, ribs, long bones, teeth, fragments of crania—of which one from the grotto of Bruniquel is sufficiently large to show that it belonged to a short head. Despite the large number of pieces we possess only four crania apt for measurements; two of the cave of Lembrive, which I have described in my *Lectures*, and two of the grotto of Furfooz, the exact measurement of which I do not possess as yet, but of which I have, by the kindness of M. Dupont, received two fine photographs. The place in which these skulls (figs. 1 to 6) were found is situated about forty mètres above the bed of the river Lesse, and contained besides human bones, some of the brown bear, ox, horse, beaver, gulo, goat, many bird and fish bones, shells of land snails still existing in the vicinity, but especially reindeer bone, some of them worked but without any markings, some were calcined, and intermixed with coals and large pieces of pottery. The human bones form a confused heap; the long bones lie horizontally, many are squeezed between the stones, the cavity of one skull is half filled with stones which can scarcely pass through the occipital foramen. Where water had access the bones are decayed, but otherwise well preserved; more than a half-dozen jaws were found, but only two crania. One cervical vertebra was pressed with such force on the scapula that the coracoid process was broken by it.

The finders conclude from all these circumstances that the cave had been filled up by means of streaming water ; to me it appears, without giving my opinion for more than it is worth, that the inhabiting of the cave and slow infiltration must have produced similar effects.

I have before me the photographs of both skulls. They differ much, but still resemble each other by the flatness of the frontal region, and the considerable development of the occiput. The first (Figs. 1, 2, 3, p. 33) is very well preserved, the bones seem lustrous and firm, and look in the photograph almost like a fresh skull. It is a well pronounced shorthead, with a broad base and regularly arched vertex, the frontal line of which seen from above is faintly convex in front. The incisors are perpendicular. If such a skull were found in a South-German grave, it would unhesitatingly be ascribed to the Alemannic tribe, although the slight elevation of the forehead and its flat ascent would indicate "a stupid Suabian." It is different with the second skull (Figs. 4, 5, 6, p. 73). The surface looks carious. There is a gap on the posterior part of the top. The proportion of breadth to length, which in the first may perhaps be 83·100, is here less and amounts to about 80. On viewing it from above, the otherwise broad forehead looks as if transversely cut off, almost with a straight line, the ends of which are received by the process of the zygomatic arch. But what particularly strikes us is the dreadful prognathism so decidedly expressed in the upper jaw deprived of its incisors. The line of the upper jaw forms with the margin of the teeth an angle of only sixty degrees (measured by the photograph), and seems as in simiadæ rather convex, whilst even in the most prognathous Negro it is rather concave. Viewed from behind, the skull appears in the median line roof-shaped, and the parietal planes of the roof almost straight, and consequently, higher than the other skull, and the base narrower in proportion to the height.

Are these differences sufficient for the assumption of a difference of a race, and an intermixture of two different stocks ? I hardly think so. Prognathism is here certainly more pronounced and more simious than I have ever seen in any skull ; but we know that in eminently orthognathous people, individual instances of this kind occur which may perhaps be looked upon as in favour of Darwin's atavism. Neither is the difference in the frontal line, and in the proportion of height, so very uncommon. But apart from this, the view from the top, with the large breadth diameter so far pushed back, is so similar in both skulls, that I feel inclined to look upon both skulls, despite their difference, as belonging to the same race, until further finds should correct this view, and establish an intermixture of two types.

I have described the skulls of Lembrive in my *Lectures*, to which I

must refer. Their width = 100 : 82 for the child and 100 : 78 for the female, agrees well with that of the Furfooz skull, as well as the straight frontal line and the backward position of the largest breadth diameter. If such conditions manifest a race affinity, which I do not assert, we must, on the other hand, not forget, that the skulls of Lombrive, present by the form of the frontal region, the roundness and arching of the whole calvaria, and by the almost obliterated superciliary arches, a nobler form, a higher development of intelligence, a greater advance towards civilisation, than the skulls of Furfooz. This is the more remarkable, as the industrial character of the reindeer period in France and Belgium agrees with it.*

Dr. Thurnam, in his copious and valuable treatise on old British and Gaulish skulls, which appeared in the first volume of the *Transactions of the London Anthropological Society*, observes, "That there is nothing in the formation of the Lombrive skulls which might induce us to distinguish them from brachycephalous or sub-brachycephalous skulls, which are found in the old Gaulish graves and the round barrows of the old Britons." This comparison seems to be the more correct, since it is unfavourable to Thurnam's view, according to which, the long skulls have in England preceded the short skulls, because the skulls of Lombrive seem at all events older than any skulls found in England either in long or broad barrows. I would, on this occasion observe, that I was rather too hasty in parallelising, as I have done in my *Lectures*, the Lombrive skulls with those of Basques. The investigations of Broca have since that time shown that the Basques were rather dolichocephalic, and that the skulls also differed greatly from the Lombrive crania by the proportion of the frontal to the occipital region.

The final result from these rather scanty facts seems to be, that during the reindeer period a brachycephalic, not very numerous, people of weak osseous structure, inhabited Southern and Central France, and also Belgium.

This people was surrounded by wild animals, which were hunted, and their remains accumulated in and about the habitations, the caves, just as the Greenlanders at Egede's time still accumulated the remains of the consumed animals, so that, as the worthy Bishop says :—

* M. Garrigou, according to a recently published treatise, does not consider the Lombrive skulls as pertaining to the reindeer, but to a more recent epoch. If this be so, we have only the Furfooz skulls as human remains from the reindeer time. This would still better agree with what is stated above. Garrigou, moreover, looks upon these skulls as mongrels of Celto-Iberians and some other people. Such an assertion appears to me to require great courage, when we are engaged in investigations requiring accuracy.

“Every Greenlander inhabits his own charnel house. No trace has hitherto been found of tamed animals. The reindeer, the bison, the horse, furnished most of the food ; but carnivora were also consumed, and their bones split for sake of the marrow. Until then there is an almost perfect agreement with the cave-bear period. But we may nevertheless recognise an important advance in civilisation in the mode of working the weapons and implements. Pottery also greatly progresses. Vessels of various kinds are met with, rudely kneaded of clay, intermixed with sand and flints, dried in the sun or hardened on the hearth, and therefore not very fit for cooking or the preservation of liquids ; still they are of an agreeable shape, and decorated with lines and drawings, or provided with handles. Then we observe an improvement in the preparation of flint implements. The reindeer men were no longer satisfied with the form of the fragments struck off from the block, but he tried to give it a better shape by further hammering it. The small narrow fragments of the so-called knives are specially noteworthy, as their edges have been worked by numberless short blows, not unlike the so-called beating the scythes.”

In the working of bones, especially the antlers of the reindeer, these reindeer men seem to have excelled. Lance and arrow-heads with barbs, knives and daggers, all kinds of flat and curved shapes apt for scraping the skins and similar objects, awls and needles of considerable fineness, with ears fit for the passage of a thread ; handles are found in quantity, and some unfinished specimens show the troublesome mode by which these implements were brought to a finished condition.

The art products of the reindeer people who inhabited France are of particular interest. The decorations on many pots and implements consisting of simple, straight, angular, or crossed lines exhibit a certain sense for beauty ; but the drawings of animals, as discovered by MM. Lartet and Garrigou, are still more surprising. They are mostly found engraved on bones, but also on slate. Those found by M. Garrigou represent heads and tails of fishes ; those in possession of M. Lartet represent large mammals, among which the reindeer is easily recognised by the antlers. Most of these drawings occupy, certainly, merely that rank in art as a schoolboy's attempts on the wall, in order, as a little nephew of mine observed, to derive pleasure from its contemplation. Many of these drawings only furnish us with the idea of horned ruminants in general, leaving to our choice to detect the difference between oxen, sheep, and goats ; others, however, are sufficiently characteristic to enable us to recognise the animal at once, although the proportions are somewhat faulty. The masterpiece in Lartet's collection is a handle carved from the antlers of a reindeer, a real sculptured work, the body of the animal being so turned and twisted that it forms a handle for a boy's hand. All other drawings are in sharp and firm

outlines graved upon the surface of the bone, and it may be seen that the artist in working it turned the bone in various directions, some of the lines showing a flat inside turned surface. Many of those drawings are known to the public by the treatises of Lartet and Christy on the caves of Perigord ; but I can from my own inspection assert that there exist in that collection many others, and these highly characteristic. Thus I recently saw in my friend Desor's collection two plaster casts of pieces (fig. 7 and 8) found in a heap of bones of the reindeer period, at Madeleine, near Tursac (Dordogne). It is a kind of kitchen-midden at the foot of a rock, about fifteen mètres long, seven mètres broad, and two and a-half mètres thick. In the middle some human remains were found. One of these pieces (fig. 8) is a broken off femur of a swan. The animal carved upon it has a short thick tail, a long straight back and belly, the head and the lower parts of the feet are wanting. A zig-zag line along the back, imitating somewhat rudely the aspect of the reindeer in summer, when the long winter-hair still hangs in flocks about the back, whilst the belly shows already the short dark summer hair. Some short lines before the fore-feet may represent the hair of the throat. The second is a fragment either of a femur or a tibia. It represents two reindeers following each other (?), the one being known by its indication of antlers. Further explorations will, no doubt, increase our treasury of art products of the reindeer period.

The limitation of these art efforts resting upon the observation and imitation of nature as regards time and place is specially remarkable. As regards time, for neither before nor after do we find similar tendencies. For down to the bronze period we only find geometrical figures, lines, angles, triangles, circles, etc., as models of art decoration. With the exception of the object in the collection of Colonel Schwab, in Biel, made of clay, which may represent a bird or some other animal, there has never been found an indication of plaster imitation in the primitive period, including the beginning of the bronze period.

The artistic imitation of nature disappears as suddenly as it appeared, only to reappear at a much later period. Another fact is remarkable as regards local limitation ; for it is only in the French reindeer caves that such pieces have hitherto been met with, nowhere else, not even in Belgium, although they have been sought for anxiously. Their occurrence in France is as far as known an isolated fact.

I must here refer to two points, which require further explanation. M. Gervais has, as is well-known, broached the hypothesis founded upon the presence of the reindeer in the south of France, that northern tribes, such as Laplanders and Finns, had emigrated at a very remote period, since, at the arrival of the Greeks and Romans, every trace of them had already disappeared. This view seems to me untenable for

several reasons. First, we consider that the reindeer, as a domestic animal, cannot be thought of separated from the dog, so indispensably requisite for managing the herd. Whoever has seen a reindeer will agree with me that man cannot master even a single couple, much less a herd of reindeer. But hitherto no trace has been found of the domestic dog among the bones of the reindeer period, nor, indeed, of any domestic animals, whilst in the Danish kitchenmiddens the dog occurs, and other domestic animals are met with in the pile-works, which, as shown by Rüttimeyer, may, by the texture of their bones, be easily distinguished from those of the wild races. Now if men from the north, who possessed the domestic dog had, with their herds, migrated throughout the European continent, they surely would have brought their dogs with them. The northern and mountain flora which attends the reindeer is another objection against this assumption. Man usually takes with him on his migrating some few animals, and it is in this way that some wild species, especially small mammals, rodents, for instance, have spread over the earth. But that a whole fauna, chamois and ibex, musk-ox and galo, bison and lemming should have immigrated with him, is opposed to all experience. The whole was indigenous, and co-existed with man and the reindeer, just as we find in an insular climate like New Zealand a tropical vegetation almost in contact with glaciers. The condition of the skulls hitherto found also militates against this hypothesis. These skulls agree with those of the Danish stone period only in one point, namely brachycephaly, but deviate from them, as far as I can see in all other essential characters. Even the difference of the habits of the people is against M. Gervais. The stoneman of the Danish kitchenmiddens, the pile-builder, who, as Garrigou has shown, existed also at a later period in France, lives in the low lands, where he erects his habitations in marshes and waters, whilst the reindeer man selects for his habitations caves and inaccessible rocky cliffs. I will, however, attribute not so much importance to this latter point, but as regards the former grounds they seem to prove that we were perfectly justified in not accepting the hypothesis of M. Gervais.

The passage cited above from Thurnam's treatise seems to me, on the contrary, to contain a hint which well deserves consideration. Thurnam has, from his comprehensive and valuable investigations, drawn the inference that long heads are chiefly found in the long barrows, and short heads chiefly in the round barrows, and that in England, at least, the former belong to an older period than the latter. The limits of this paper do not allow me to enter upon the details upon which Thurnam founds his assertion. I cannot, however, omit drawing attention to the fact that, even among the long heads, were found by

Thurnam himself very decided short heads, registered by him as coming from long barrows; and that Thurnam himself admits that the law laid down by him as applicable to England may not apply to the continent. But, admitting that to be so, we cannot easily imagine that such a widely-spread type as the reindeer man should have left no progeny in the intermixture of peoples, and it is very possible that the few short heads occurring in the long barrows of England may have been the first immigrants who, multiplying subsequently, gradually extirpated the original dolichocephalic type of the primitive inhabitants of Great Britain. But, despite this supplantation, the long skulls are not entirely destroyed in England; and Thurnam's tables show that also in the round barrows some dolichocephalic skulls are met with.

It is only after the reindeer period that we come to the later stone-periods of the kitchenmiddens and sepulchres of Denmark, old and more recent pile-works, dolmens, the bronze period, with its attendant progress towards the breeding of domestic animals, grinding of stone weapons, agriculture, and the knowledge of metals. To enter upon these subjects must be reserved for another work for which I collect materials. Here it may be sufficient to have shown that all the characters, the significance and importance of which we endeavoured to point out for the elucidation of primitive times, combine, as regards Central Europe, in the demarcation of two chief periods: the cave-bear epoch, distinguished by large now extinct species of beasts of prey and pachydermata, rude flint implements, coarsely worked bones, and long cranial forms of a strong race of men—and the reindeer period, characterised by the northern fauna of a cold climate, by hammered stone weapons, carved and artfully decorated bones, and the short skulls of a small and more delicately constructed, but, at all events, a very intelligent art-endowed race of men.

Postscript.—Professor J. Cocchi, director of the Geological Museum at Florence, has kindly placed at my disposal, besides some Etruscan and Roman skulls, a very old skull (fig. 9 and 10), concerning which he will shortly publish particulars as regards the geological stratum in which it was found. It cannot, of course, be my object to anticipate in any way the observations of my kind colleague. I shall, therefore, merely remark that this relic, the aspect of which alone betrays high antiquity, was found deep under the soil in a bed of bluish-grey plaster clay, containing also, as usual in the Aruv valley, bones of diluvial extinct species of animals, especially of the elephant. Exact details, as regards the bed, will be given in Professor Cocchi's treatise, in which it will be shown that this Florentine skull must, as regards antiquity, be placed by the side of the Engis and Neander skulls, and that, therefore, it is the third skull of the hitherto known oldest period,

but the first found on the surface, and not as a cave deposit, in which, as far as I know, no stone weapons were yet found.

This skull is, unfortunately, not perfect, the cranial portion only being preserved, which is filled with bluish-grey plaster clay. The frontal bone is nearly perfect, wanting only a small piece of the right external canthus. The left parietal is also nearly perfect, whilst the right is badly mutilated. Of the occipital there is only the squama extant, but broken on the right; a piece of the occipital spine is also wanting. It admits of but few measurements and only approximately, as the sutures are rather separated, and many points requisite for measurement are lost.

MEASUREMENTS.

Millimètres.

Greatest length	197	
„ breadth.....	172	(Computed from half the width,
Proportion of length to breadth		which can only be measured on
(Indice cephalique).....	100 : 87	the left, and which amounted
Frontal arc, nasal to coronal suture	130	to 86 mm.)
Sagittal suture	137	
Least frontal breadth	104	(Computed from the half.)
Distance of the frontal eminences ...	61	

The skull is consequently large both in length and breadth; the cranial bones are of the usual thickness. The superciliary arches project but little, but present a perceptible depression across the forehead. The frontal protuberances are placed remarkably low—the low forehead proceeds from them almost perpendicularly, and also ascends very flatly towards the vertex, which is situated above the strongly projecting parietal protuberances. The occiput projects considerably backwards, and its lower part is strongly bent inwards.

From these measurements and their comparison, it results that this skull has not the slightest resemblance to the Neanderthal and Engis skulls, except that it shows in the occipital part some likeness to the Neander skull. It as little resembles the Etruscan skulls which I examined in Italy; nor the three skulls of the Bronze period of Elba, which M. Raphael Foresi kindly showed me; nor the Roman and modern Italian skulls.

Prof. Bartolomeo Gastaldi has further placed at my disposal a calvaria in the Valentino museum, which was found near Mezzara Corti in the diluvium of the Po, at a depth of 7 *mètres 3 décimètres*, in a bed in which, 3 *mètres* deeper, a splendid skull of the megaceros was met with. The above comparatively small and delicate head belongs to the Ligurian type as distinguished by Niccolucci, and is characterised by a transverse depression of the forehead and of the vertex. The cranium of Mezzana Corti presents the following proportions:—

	Millimètres.	
Greatest length	176	
„ breadth.....	142	(Not quite certain, on account of
Proportion of the two measuremts. 100 : 80·4		imperfect state of one side.)
Frontal breadth	100	
Frontal arc	128	
Sagittal suture	122	
Occipital arc.....	114	
Perpendicular circumference	364	

These measurements agree exactly with the average computed by me from four Ligurian skulls.

I must finally add, that the hope expressed above of further artistic finds of the reindeer period has been fulfilled by the discovery in the grotto of Arcy, by Lartet and Vibraye, of engravings on bones, representing a hairy long-maned elephant, *i.e.* the mammoth. The engraving on ivory, in the possession of M. Lartet, shows so characteristically all the characters of the elephant, as to admit of no doubt that the artist who engraved it must have taken a living mammoth for his model.

PROCEEDINGS OF THE PARIS ANTHROPOLOGICAL SOCIETY.*

January 19, 1865.—M. Broca presents to the Society several crania found at Maintencn, and in tumuli of Meloisy (Côte-d'Or). M. Martin de Moussy observed that the extraordinary thickness of cranium No. 2 of Meloisy reminded him of a passage in Herodotus, who relates that after a battle of the Persians with the Egyptians the crania of the latter were found to be very thick compared with those of the Persians, which were thin. Herodotus attributes this to the circumstance that the Persians covered the head whilst the Egyptians were in the habit of going bareheaded in the sun.

M. Pruner-Bey considered this theory as purely imaginary, as the thickness of the skull depended on race. The present Egyptians, who covered the head, possessed crania as thick as their ancestors, whilst modern Hindoos, who expose the head to the burning rays of the sun, had skulls as thin as the Persians, who are of the same race.

Mummification of the Brain.—M. Broca presents several cerebral hemispheres mummified for four years, and hard as pasteboard. These brains, the weight and volume of which is considerably reduced, have well preserved their form, and are more suitable for the study of

* Continued from No. XVII, p. 239.